Meltio for Defense and Military

July 2022

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- Market Opportunity
- Technology
- Products
- Materials
- Applications

About

Incorporated in June 2019 through a joint venture of AddiTec, a Las Vegas based technology company, and Sicnova, a leading 3D printing commercial distributor. Meltio proudly counts with the strategic support of ArcelorMittal, the largest steel producer in the world.

Our mission is to delight customers, partners and employees by pioneering the development of affordable metal 3D printing solutions that are **reliable, safe and easy to use**, continually reinforcing our status as disruptors.

Excellence in technology and commercial development

80th Employee hired

150+ systems on the ground

+35 Partners for local sales, integration, service and support

Meltio’s Partner Ecosystem

Supporting you in every step of the way

+35 Sales and Integration Partners

Offering best-in-class local service and support to our customers

+25 Research and Industrial Partners

Dedicated to fast-track development of new materials and applications

Meltio Metal 3D Printing Solutions

Meltio M450 3D Printer

For **near net shape** manufacturing

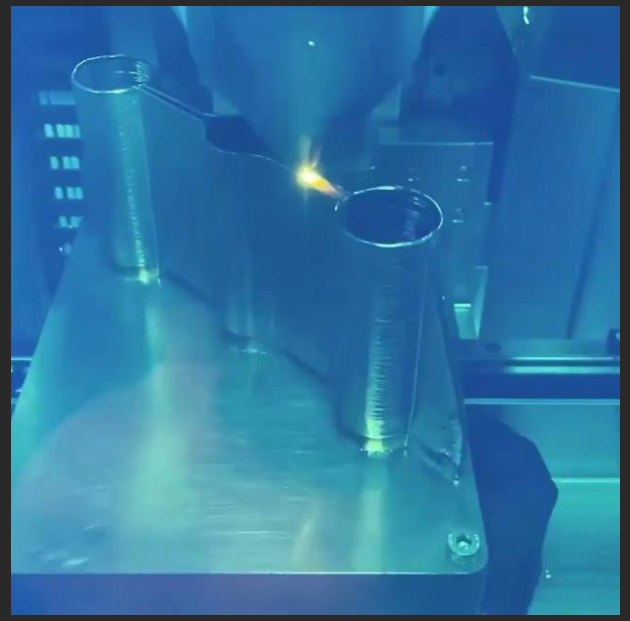
Meltio Engine CNC Integration

For **hybrid manufacturing, repairs** and **feature addition.**

Meltio Engine Robot Integration

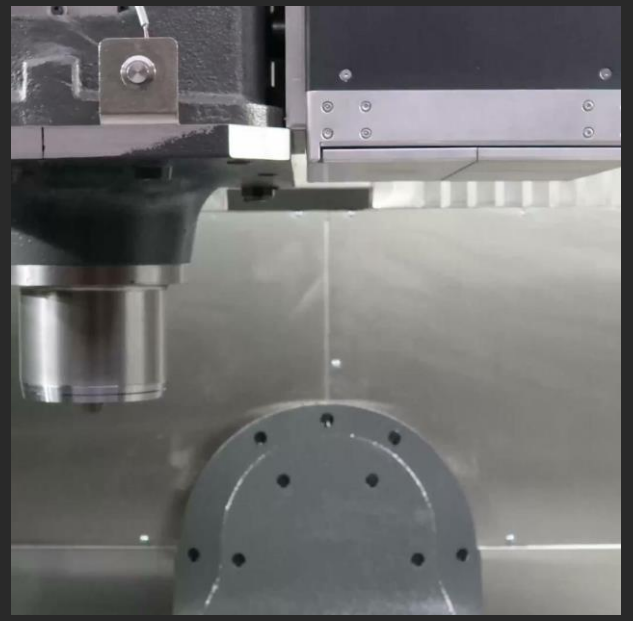
For **large, complex parts** and **laser cladding**

Meltio Metal 3D Printing Solutions



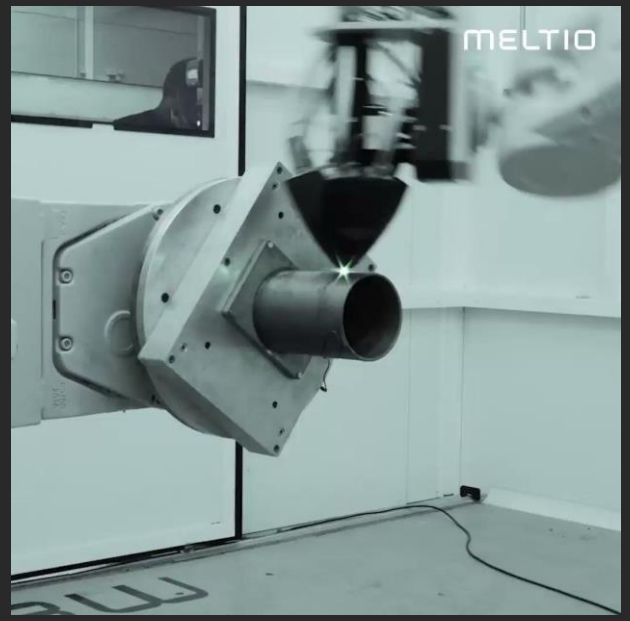
Meltio M450 3D Printer

For **near net shape** manufacturing



Meltio Engine CNC Integration

For **hybrid manufacturing, repairs** and **feature addition.**



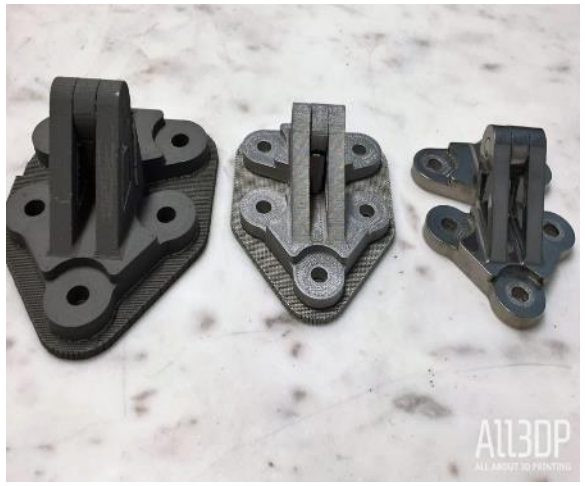
Meltio Engine Robot Integration

For **large, complex parts** and **laser cladding**

Metal 3D printing **has not changed** for the past 20 years.

Metal additive manufacturing barriers for industrial adoption

High Investment, Development and Running Costs



Limited Part Size and Part Properties

Subpar User Experience and Convenience

The global metal manufacturing market amounts to $5.4 trillion.

The current Metal AM market is $3.1B and growing at 30% YoY, with applications restricted to medical personalization and aerospace.

- $3B Metal AM

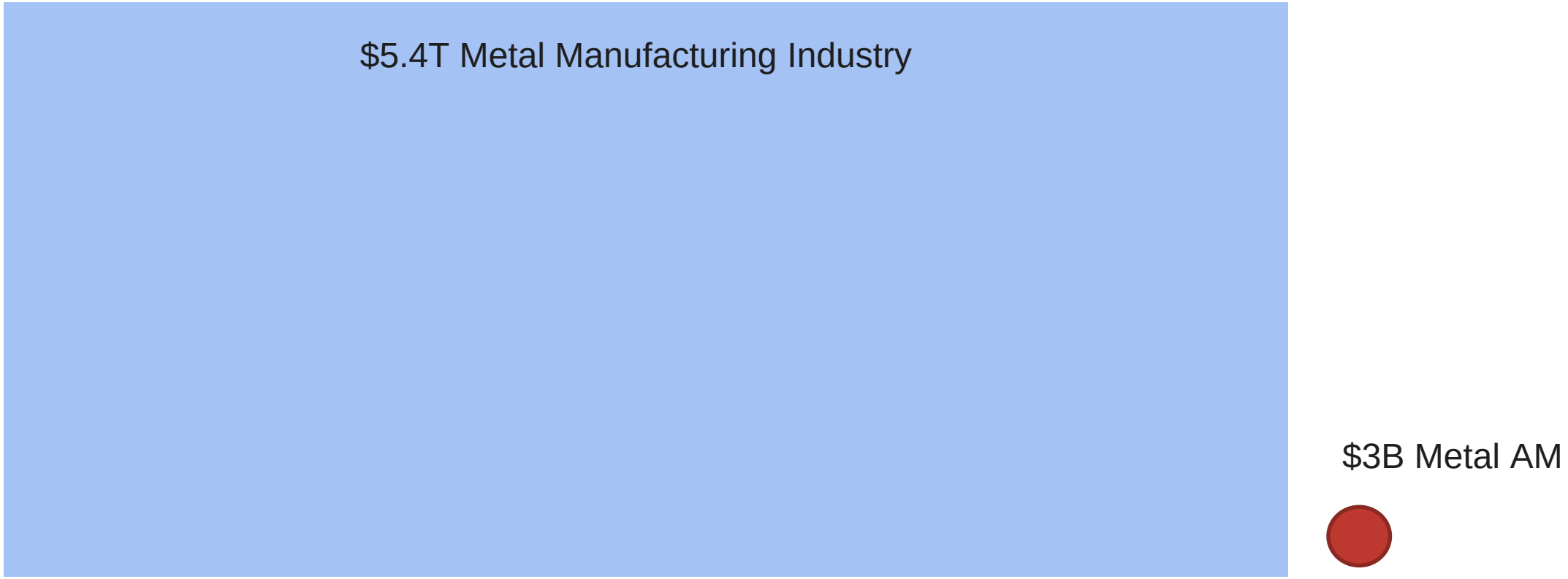
Small and
Personalized

High Value and
High Margin

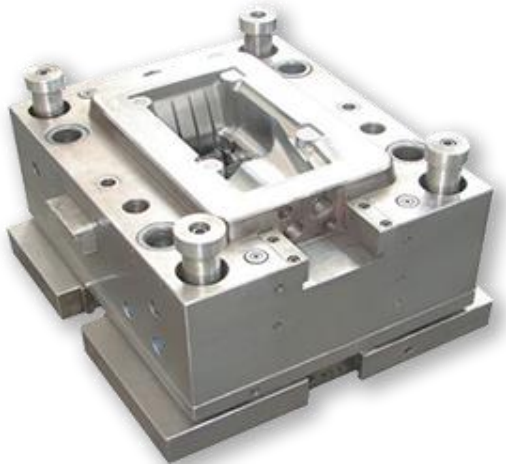
Conceptual and
Sophisticated Designs

The global metal manufacturing market amounts to $5.4 trillion.

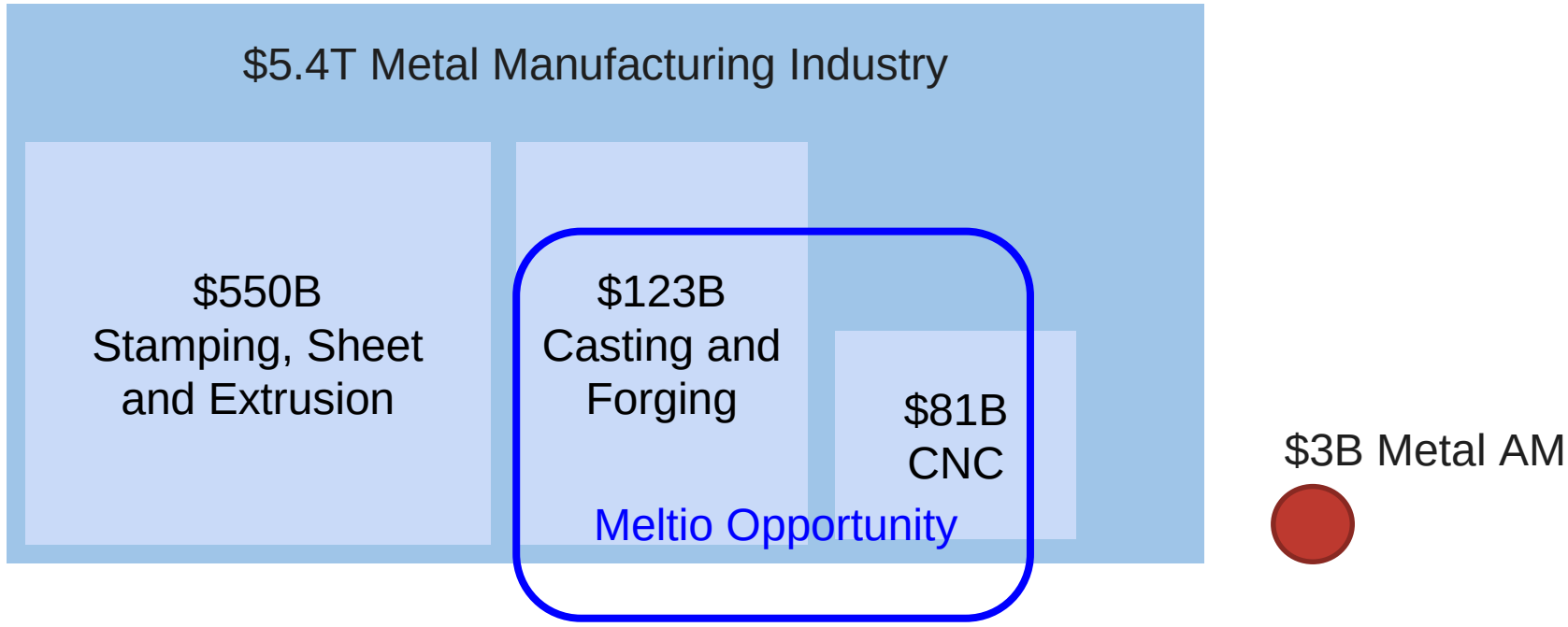
The current Metal AM market is $3.1B and growing at 30% YoY, with key applications being medical personalization and aerospace.



Traditional markets like CNC are growing at 5% YoY but valued at $81.15B, increasing market value at +$4B/year, more than the whole Metal AM market today.

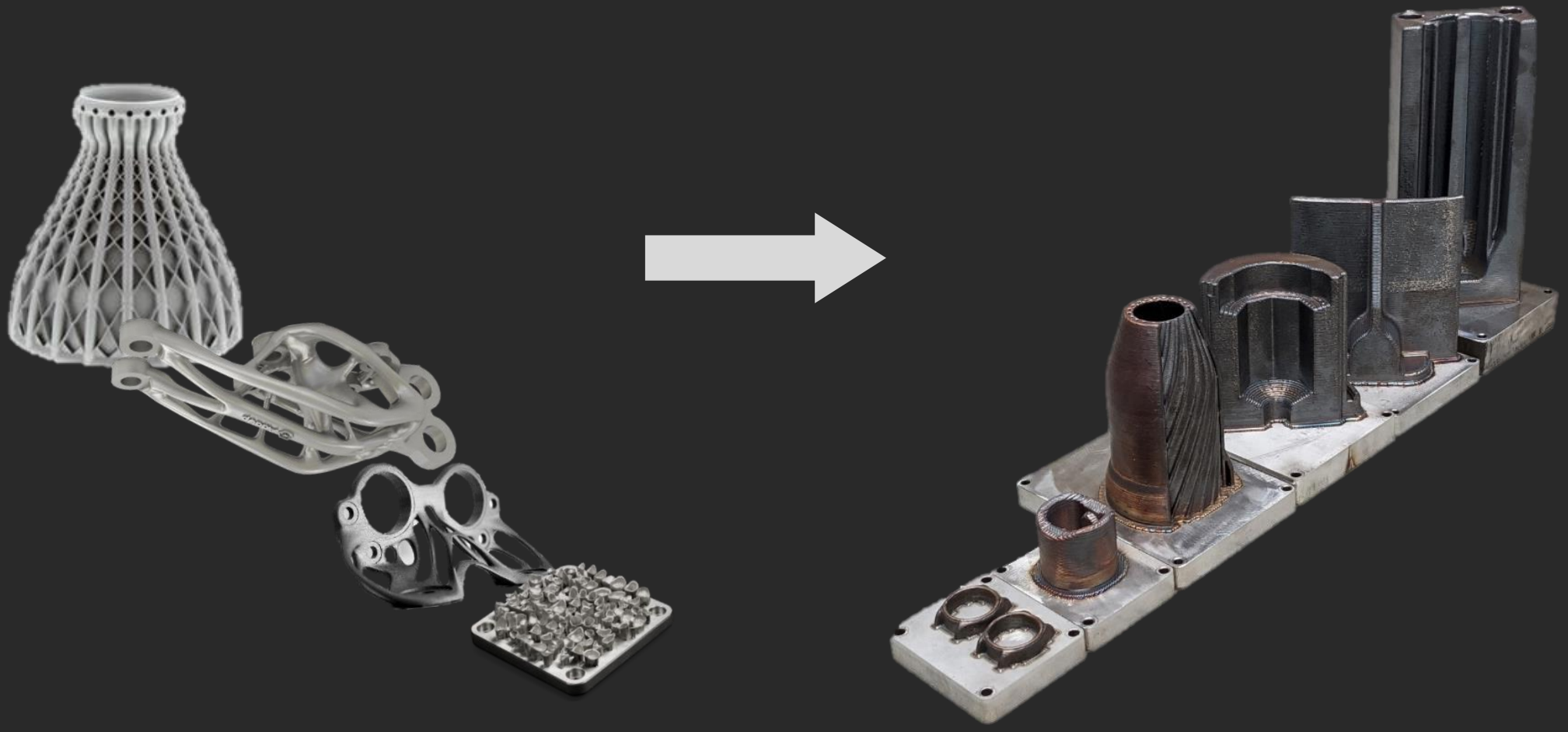


A lot of the benefits on the Metal AM require huge design implications to justify the capital and running costs, Meltio benefits are tangible and unique on how those complement today's metal manufacturing parts and methods (time to part, lower cost, multi-metal…)



MELTIO

Meltio enables the **shift from niche to industrial** applications for metal 3D printing

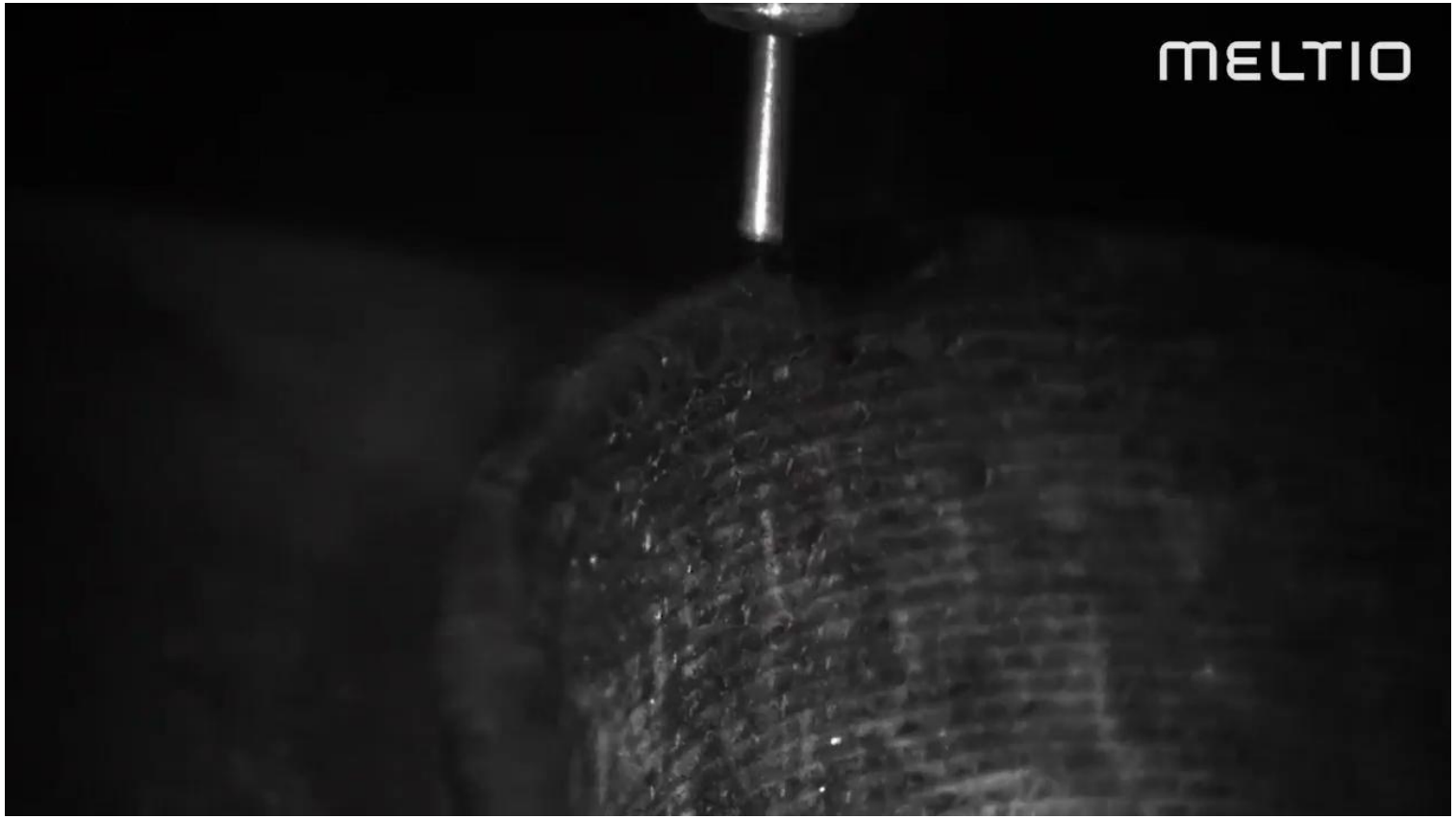


Technology

A **cost-effective** wire laser metal deposition technology

Laser Metal Deposition (LMD)

LMD is a Directed Energy Deposition (DED) process that functions by precisely stacking layers of weld beads when introduced into the laser generated melt pool



Meltio LMD 3D printing process

The only process able to deliver **strong, affordable and fully dense metal parts within a few hours**

1
Print

With steels, titanium, inconel and many commodity alloys

2
Post-process

With heat treatment, CNC machining, bead blasting, polishing…

3
Cut

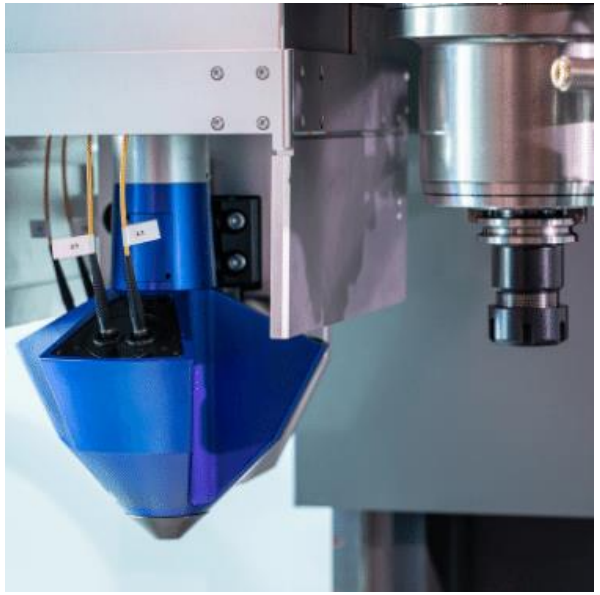
Remove the build plate using a band saw or wire EDM

Key Technology Features

Meltio’s technology comes packaged in a compact 1.2kW deposition head, host of multiple lasers and capable of processing multiple materials.

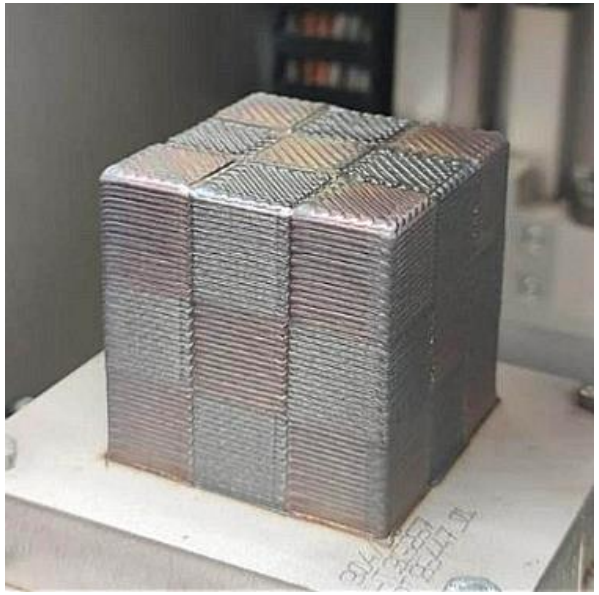
Safe and Reliable

The bulk of the 3D printing process is built around wire, the safest, cleanest and easiest to work with metal feedstock.



Integration Ready

Turn an existing CNC or robotic platform into an hybrid manufacturing system with no inherent size constraints.



Multi-metal 3D Printing

Print dual wire for hard-facing or anti-corrosion applications, or wire and powder to create new alloys on the fly.

Meltio Deposition Head

Coaxial Wire Feed

Can print geometries in any direction. Wire comes through the center of the melt pool thanks to the distributed laser system.

Integrated Wire Feed/s

Critical for high process reliability and unique to Meltio. Short distance from feeder to process is necessary for maximum wire feeding precision.

Distributed Laser System

A total of 1,2kW of laser power distributed across six 200W lasers. It provides an extremely long service life due to low optical densities.

Easy to Service

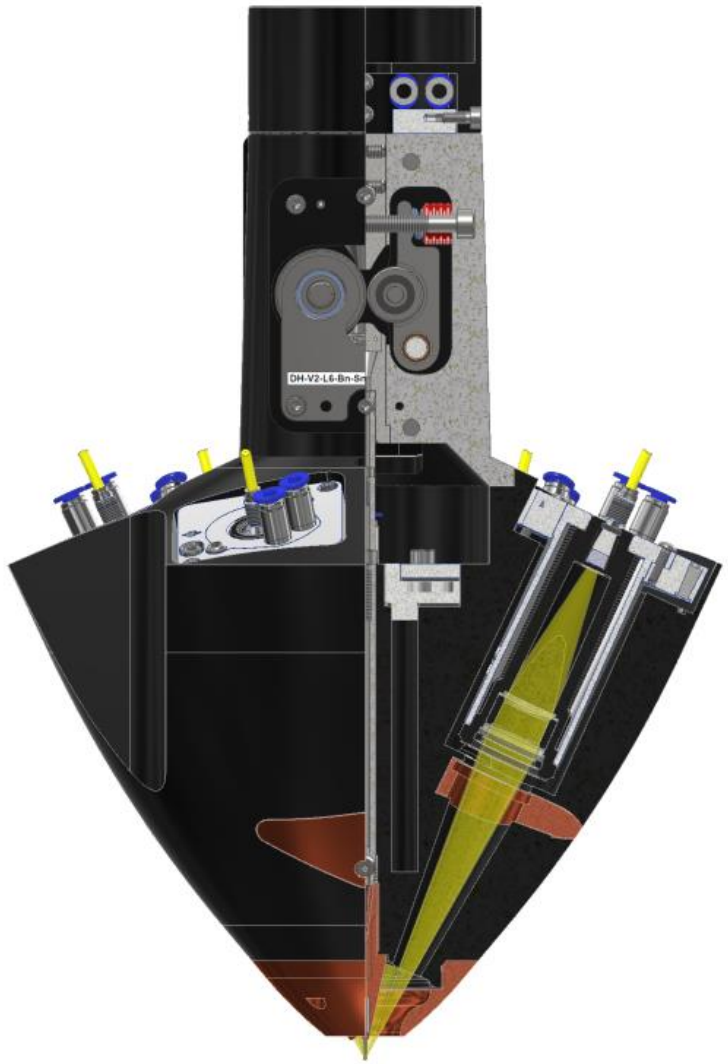
All wear parts like the wire nozzle and protective optic assembly are very easy and low-cost to replace.

Shield Gas Ring

The head has prevents oxidation through a large nozzle ring with very good gas distribution just a few millimeters from the melt pool.

Integrated Process Control

Sensors monitor the laser fibers and the deposition process. The system will regulate automatically if an irregularity is detected, or put itself on hold in critical conditions.



300mm Tall
200mm Diameter

The Benefits of a Wire Based Process

Meltio started as a powder and wire 3D printing technology provider, however, after 2 years in operation 99% of our customer base and R&D work is around improving the laser wire process due to its obvious benefits towards industrial adoption.

0% Material Waste

Meltio’s multi-laser metal deposition process enables the wire to enter the meltpool coaxially effectively using 100% of the material, powder based DED processes have 30-50% material waste which cannot be recycled.

Up to 10x Lower Cost

Wire feedstock is a welding commodity and unlike powder it is available from 5€/kg. In some alloys the price difference is up to an order of magnitude.

Up to 4x Productivity

Thanks to its higher material efficiency the wire-laser DED process is faster whilst requiring lower laser power compared to powder DED processes.

Meltio’s Wire Laser (W-LMD) vs Wire Arc (WAAM)

Within Directed Energy Deposition (DED) the wire laser metal deposition is the novelty. Despite the fact that both processes use welding wire as feedstock the wire laser process is substantially improved in different areas.

Better Microstructure

The laser process from Meltio delivers an extremely compact heat affected zone which mitigates heat transfer to the layers below nor to the vicinity of the melt pool.

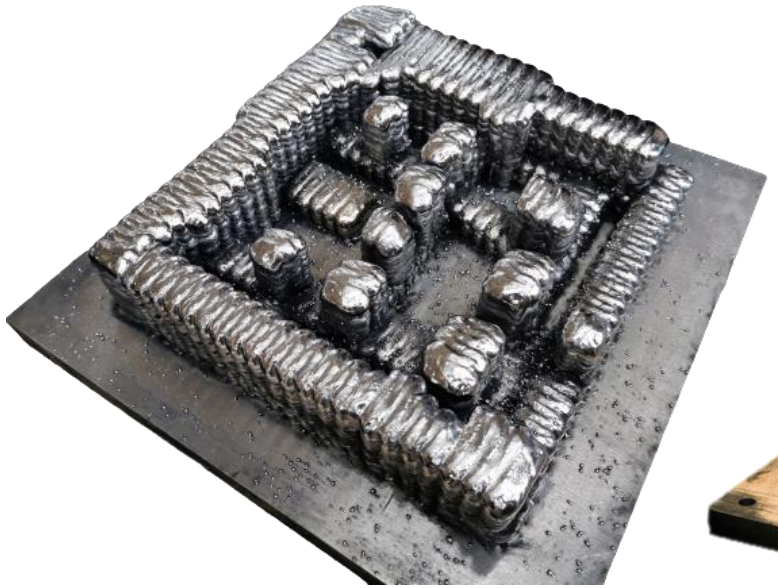
Controlled Process

The wire-arc process is by nature out of control, for the past 20 years a lot of overhead has been required to stabilize the process through scanners and thermal cameras. Meltio’s wire enters the meltpool coaxially and melts at the point of contact with the substrate.

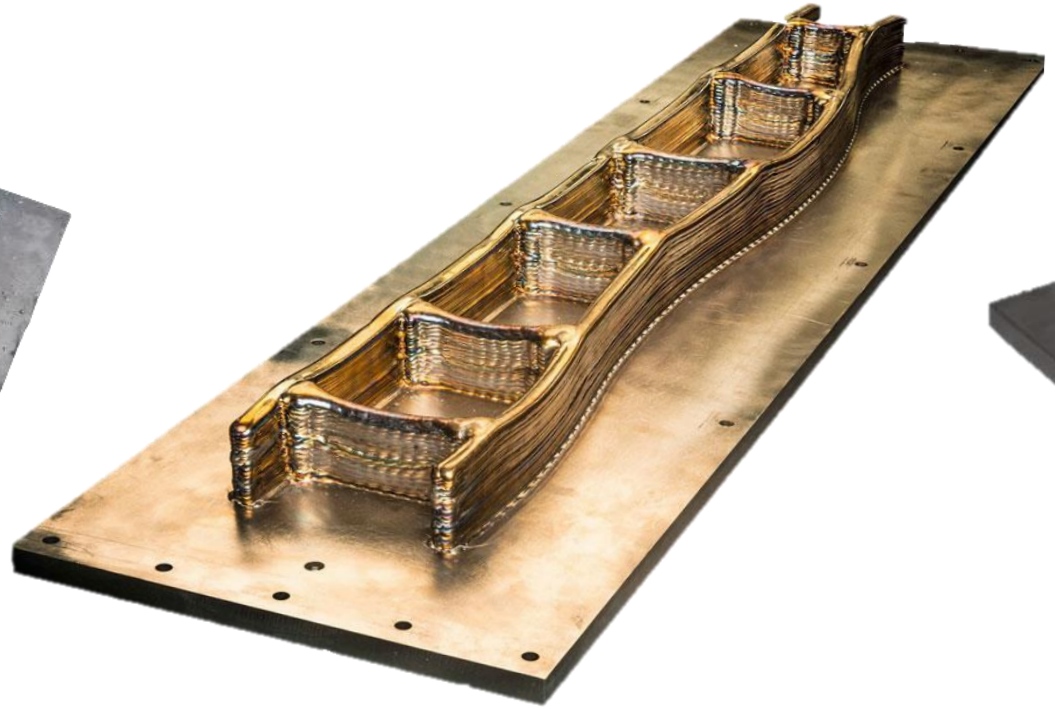
Minimal Over Thickness

Thanks to the lower heat input and controlled wire-laser process the surface rivals powder based processes. Typically WAAM requires 5mm over thickness compared to 1.5mm in wire-LMD.

Wire-Arc (WAAM) Raw Surface Finish



Delivers rough surfaces



Suited for very large parts

+5mm extra stock required

Meltio’s Wire-Laser (W-LMD) Raw Surface Finish

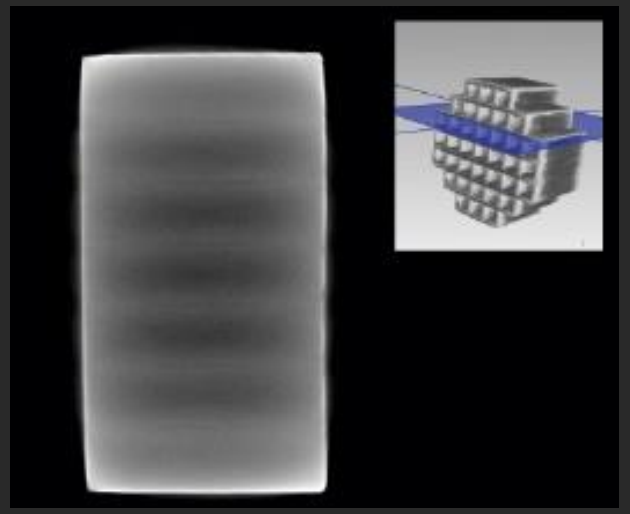
Achieves very smooth surfaces

Can be used to print large, medium and small parts

Only 1.5mm extra stock is required in critical areas

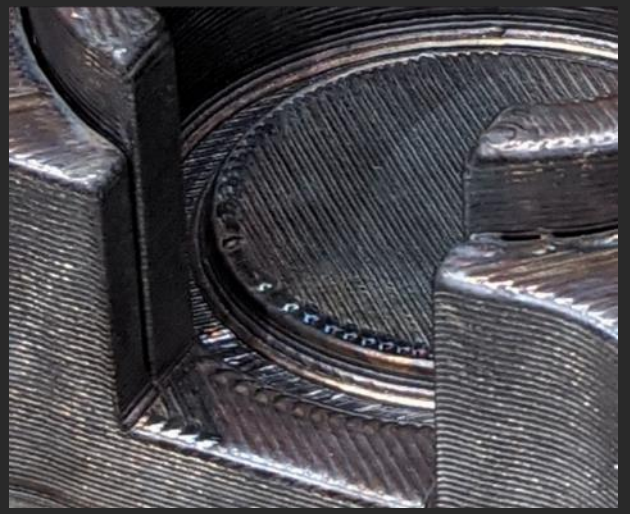
Excellent Mechanical Properties

Meltio’s compact heat affected zone process achieves exceptional mechanics, decreased thermal stress and near isotropic properties, exceeding casting and forging material properties.



Consistent 99.998% densification

Meltio’s LMD process produces fully dense parts with superior microstructure.



From 0.4 to 1.2mm layer heights

Under some conditions, Meltio’s surface roughness using wire outperforms those produced with powder based processes.

Post-process when necessary

Meltio’s overthickness is homogenous and for applications printed in high-resolution only post-treatment of critical areas is necessary.

Stainless Steel 316L	Wrought Properties	Cast Properties	Meltio XY Properties	Meltio XZ Properties
Tensile Strength (MPa)	550	515	635 ± 13	650 ± 7
Yield Strength (MPa)	260	208	390 ± 30	380 ± 17
Elongation (%)	35	40	52 ± 3	46 ± 4

Titanium 64	Wrought Properties	Cast Properties	Meltio XY Properties	Meltio XZ Properties
Tensile Strength (MPa)	930	860	950 ± 5	-
Yield Strength (MPa)	860	758	882 ± 5	-
Elongation (%)	>10%	>8%	12 ± 0.5	-

Inconel 718	Wrought Properties	Cast Properties	Meltio XY Properties	Meltio XZ Properties
Tensile Strength (MPa)	1241	802	1308 ± 10	1235 ± 11
Yield Strength (MPa)	1034	758	1128 ± 20	1040 ± 12
Elongation (%)	10	5	6.6 ± 2.1	8.5 ± 0.7

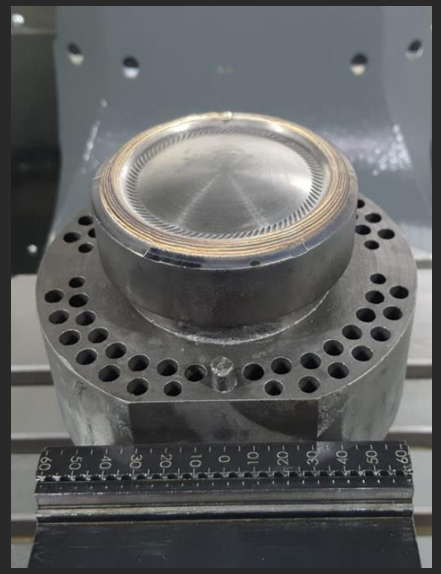
Visit www.meltio3d.com/materials to download all material datasheets

MELTIO

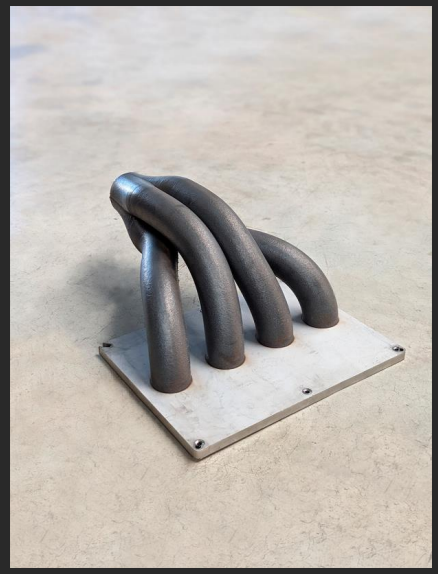
Meltio Metal 3D Printing Applications

Near Net Shapes

Hybrid Manufacturing



Repairs and Feature Addition



Large and Complex Parts

Laser Cladding

Applications across industries and the product life cycle

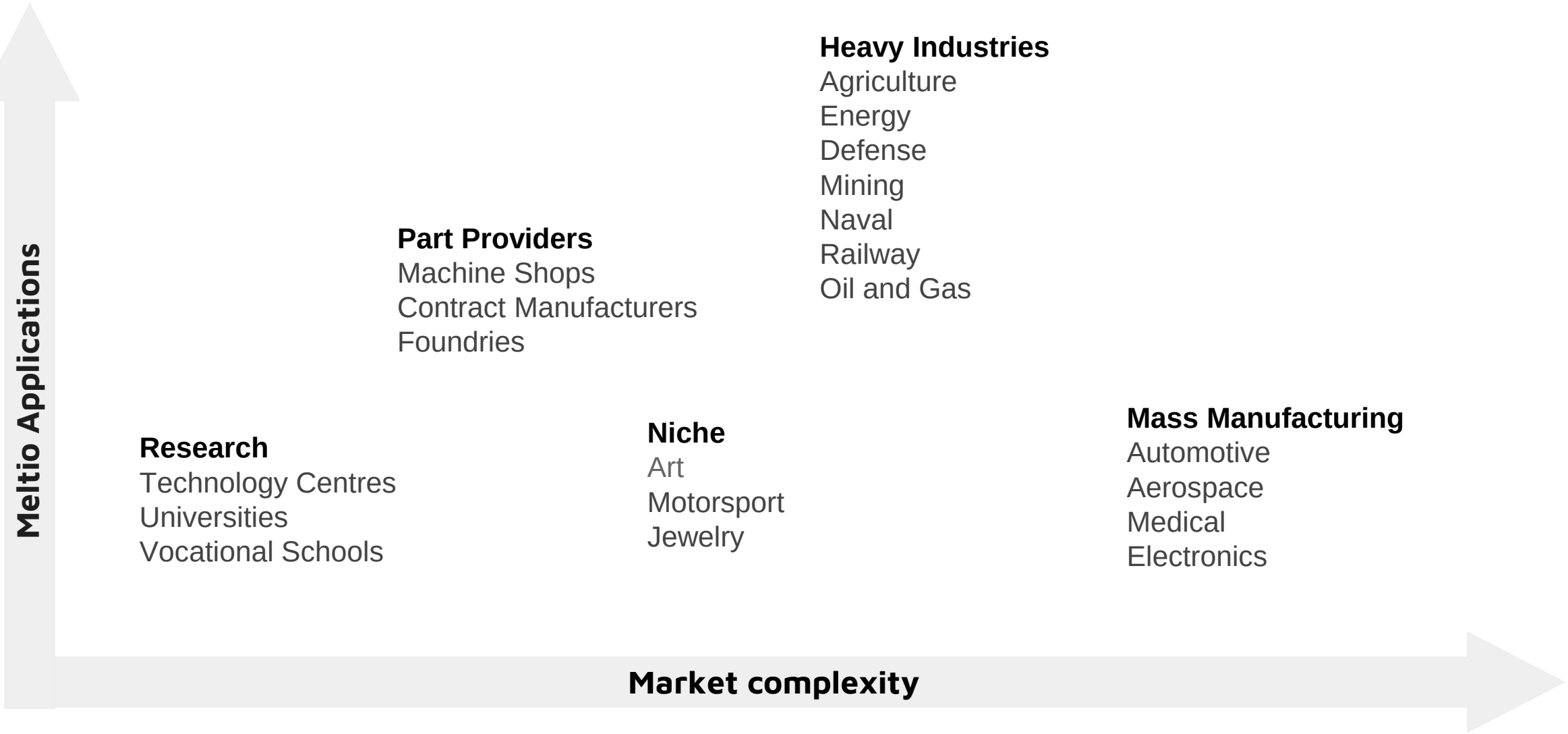
Material Research in Technology Centres and Universities

Spare Parts and Repairs in Energy, Marine, Defense and Heavy Industries

Near Net Shapes and Repairs in Machine Shops and Foundries

Mass Manufacturing in Medical, Aerospace, Food, Transportation and Consumer Industries

Key industries for Meltio applications



Defense and military steers industrial development

Key users of Meltio in defense and military

EXTERNAL

R&D
Suppliers of military reserach and development services.

Small and Medium Suppliers
Manufacturing companies delivering to the armed forces.

Large OEM Suppliers
Key players in the supply chain for defense and military.

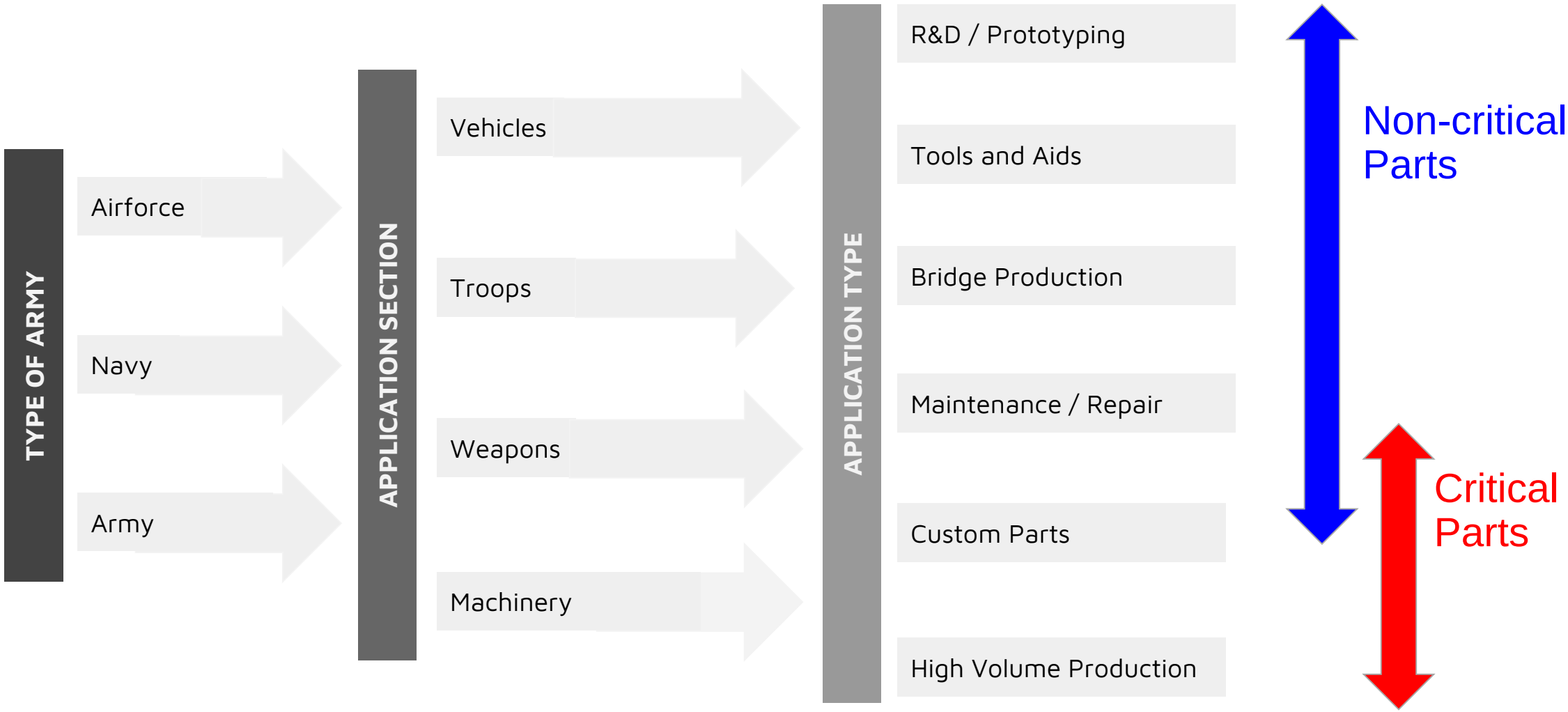
INTERNAL

R&D
Internal research and development facilities

Job Shops
Internal manufacturing facilities that provide parts.

On Deployment
Manufacturing capability on the field, deployed in remote areas.

Opportunity areas for Meltio

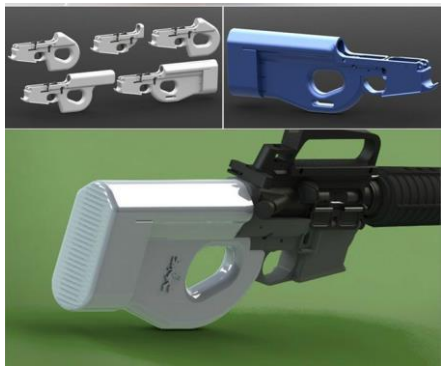


Defense and Military for Meltio

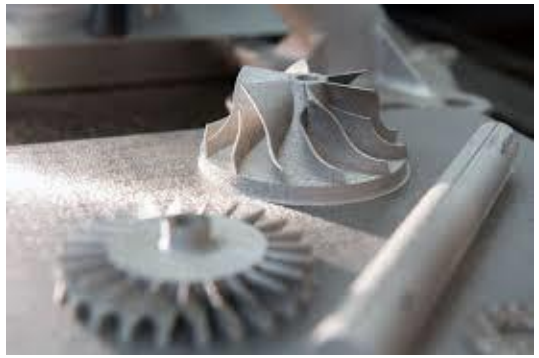
MILITARY BRACKETS
Application sector:vehicles
Type of application: pare part

CASINGS FOR EQUIPMENT
Application sector:vehicles/weapons
Type of application:spare part

VEHICLE SPARE PARTS
Application sector:vehicles
Type of application: spare part



WEAPON ACCESSORIES
Application sector: Weapons
Type of application: Prototype



IMPELLERS
Application sector:vechicles
Type of application: spare part

MACHINERY COMPONENTS
Application sector:Any
Type of application: tools

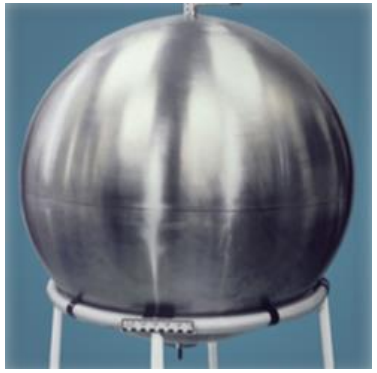
Defense and Military for Meltio

Broken Gear
Application sector: vehicle
Type of application: repair

Tank wheel repairason
Application sector:vehicle
Type of application: repair

Vehicle handle
Application sector:vehicle
Type of application: spare part

Propeller repairason
Application sector: vehicle
Type of application: repair



Spherical tank
Application sector:vehicle
Type of application:repair/replacement

Custom Helmet for H1
Application sector:Soldier Wearable
Type of application: Personalization

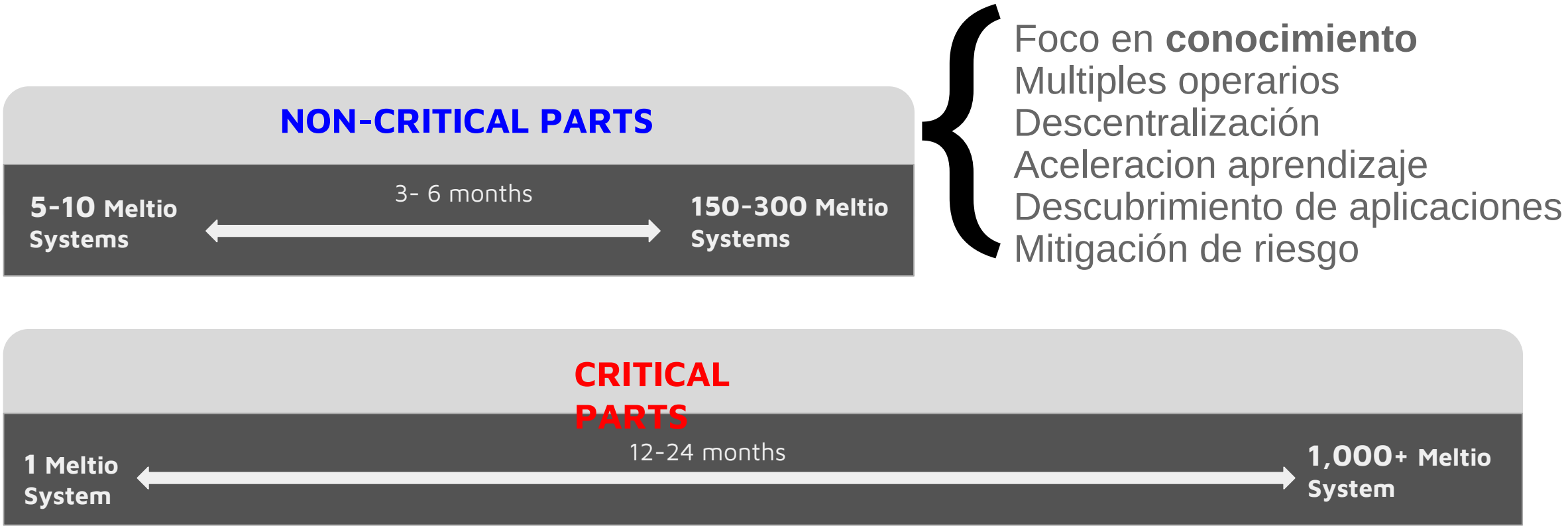
Defense and Military for Meltio

3D Printing
1x Meltio M450
1x Carbon Fiber

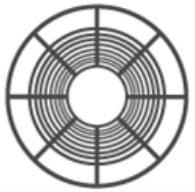
Hybrid Manufacturing
1x Meltio Engine
1x CNC
1x Lathe

3D Scanning
1x Hand-held scanner

Critical vs Non-critical parts



Meltio’s Navy Proposal



3D Printing centers

1-5x R&D labs

10-30x Manufacturing and repairing hubs

Training and technical support

Digital storage

Join us!

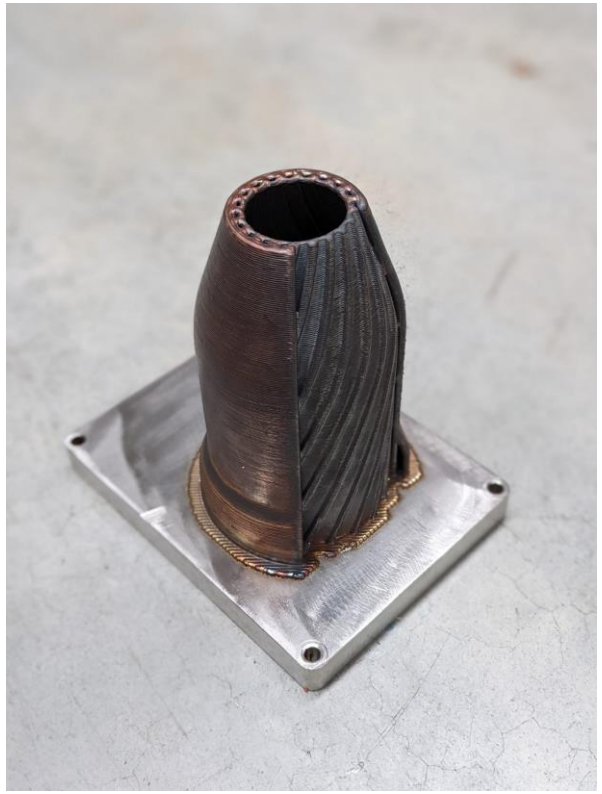
www.meltio3d.com

SS316L – Glass Mold Core

Meltio M450
Size: 158,5 x 79,3 x 144,3 mm
Weight: 6 kg
Print Time: 24 h
Print Cost: € 103,44

Ti64 – Watch Bezels

Meltio M450
Size: 53,37 x 44,59 x 10,85 mm
Weight: 29,22 kg
Print Time: 5 h 40 min
Print Cost: € 31,09



SS316L – Combustion Chamber

Meltio M450
Size: 110,5 x 110,5 x 170 mm
Weight: 4,88 kg
Print Time: 27 h 30 min
Print Cost: € 97,09

SS316L – Engine Manifold

Meltio Engine Robot
Size: 205 x 360 x 473 mm
Weight: 5,22 kg
Print Time: 19 h 23 min
Print Cost: € 95,86

SS316L – Screw Compressor

Meltio Engine Robot
Size: 75 x 75 x 230 mm
Weight: 2,55 kg
Print Time: 7 h 23 min
Print Cost: € 31,81

SS316L – Naval Propeller

Meltio Engine Robot
Size: 600 Ø mm
Weight: 12,1 kg
Print Time: 43 h 40 min
Print Cost: € 189,71

SS316L – Bagging Nozzle

Meltio M450
Size: 99 x 116 x 258 mm
Weight: 1,78 kg
Print Time: 6 h 15 min
Print Cost: € 31,03

In718 – Gas Turbine Fan Blade

Meltio M450
Size: 35 x 75 x 135 mm
Weight: 1,11 kg
Print Time: 3 h 10 min
Print Cost: € 67,85

SS316L – Airfoil Cooling Blade

Meltio M450
Size: 200 x 152 x 55 mm
Weight: 526 g
Print Time: 3 h 50 min
Print Cost: € 12,17

SS316L – Blisk
Meltio Engine Robot
Size: 500 x 500 x 60mm
Weight: 9,15 kg
Print Time: 26 h 25 min
Print Cost: € 114,07

SS316L – Overhang Test
Meltio Engine Robot
Size: 350Ø mm, H 180 mm
Weight: 2,14 kg
Print Time: 6 h 26 min
Print Cost: € 31,91

SS316L – Spherical Tank
Meltio Engine Robot
Size: 500 Ø mm
Weight: 29,6 kg
Print Time: 81 h 20 min
Print Cost: € 433,07